HYBRID FORK SUSPENSION

HFS

INSTALLATION MANUAL
USER MANUAL
TRIAL CLASSICS

12/2010 (V.3.3)
(UK)

This Manual covers following models:

Make	Model	Year	Model code
OSSA	MAR 250 1ª Serie	1972	**OS01**
OSSA	MAR 250 74	1974	**OS02**
OSSA	MAR 350 1ª Serie	1975	**OS03**
OSSA	MAR 350 76 (2ª serie)	1976	**OS04**
OSSA	MAR 250 (77)	1977	**OS05**
OSSA	TR-77 (77)	1977	**OS06**
OSSA	TR-80 (80)	1980	**OS07**
OSSA	303	1983	**OS08**
BULTACO	Sherpa T Sammy Miller	1964	**BU01**
BULTACO	Sherpa T Mod. 10-2	1966	**BU02**
BULTACO	Sherpa T Mod. 27	1967	**BU03**
BULTACO	Sherpa T Mod. 49	1968-70	**BU04**
BULTACO	Sherpa T Mod. 80	1971	**BU05**
BULTACO	Sherpa T Kit Mod. 92	1972	**BU06**
BULTACO	Sherpa T Kit Mod. 125	1974	**BU07**
BULTACO	Sherpa T Kit Mod. 151	1974	**BU08**
BULTACO	Sherpa T Mod. 159	1975	**BU09**
BULTACO	Sherpa T Mod. 183 M Soler	1976	**BU10**
BULTACO	Sherpa T Mod. 191	1976	**BU11**
BULTACO	Sherpa T Mod. 199	1977	**BU12**
BULTACO	Sherpa T Mod 199A	1977	**BU13**
BULTACO	Sherpa T Mod 199B	1978	**BU14**
MONTESA	COTA 247	1970-75	**MS01**
MONTESA	COTA 348	1976	**MS02**
MONTESA	COTA 348 (MR)	1976-78	**MS03**
MONTESA	COTA 349	1979	**MS04**
MONTESA	COTA 349 (Blanca)	1980	**MS05**
MONTESA	COTA 248 (Blanca)	1980	**MS06**
MONTESA	COTA 200	1980	**MS07**
MONTESA	COTA 349 /4	1982	**MS08**
MONTESA	COTA 350	1983	**MS09**
MONTESA	COTA 242	1983-85	**MS10**
MONTESA	COTA 330	1985	**MS11**
FANTIC	200	1981	**FAN1**
FANTIC	240 Profesional	1983	**FAN2**
FANTIC	300	1984	**FAN3**
SWM	320 TL Guanaco	1978	**SWM1**
SWM	320 TL New	1981-82	**SWM2**
SWM	350 Jumbo	1983	**SWM3**
APRILIA	320 Roja	1979-81	**APR1**
APRILIA	320 Blanca	1982-83	**APR2**
APRILIA	TX 300	1984	**APR3**
MERLIN	DG 3.50	1983-84	**MER1**
HONDA	TLR 200	1982	**HT01**
HONDA	TLR 250	1982	**HT02**

This Manual covers following models (cont):

Make	Model	Year	Model code
AJS	G80 CS (marzocchi)	1958	**AJS1**

ENGLISH

HYBRID FORK SUSPENSION SYSTEM

Hybrid Fork Suspension system (HFS) consists in a gas spring and in a helicoidal spring for each fork. Gas spring is received assembled from factory and ready to be installed in your motorbike. After installing the system, it is necessary to adjust it using the pump that is provided with the kit, following instructions that will be explained later.

SAFETY INSTRUCTIONS

For kit installation you must read this manual carefully, making sure that you fully understand all its content. If you do a step without considering safety recommendations, it may appear damages in your motorbike, or in kit components that might cause an accident during its installation process or during its usage.

WARNING

Indicates that if safety instructions are not followed, it might cause severe or fatal injuries to the person that is working with the suspension, inspecting it or using it.

GENERAL WARNING

TO RIDE ON BIKE IS A RISKY ACTIVITY THAT REQUIRES THE DRIVER KEEPING UNDER CONTROL THE MOTORBIKE UNDER ANY CIRCUMSTANCE; TO REDUCE PROBABILITY TO SUFFER INJURIES OR A FATAL ACCIDENT, READ COMPLETELY THIS MANUAL AND COMPLY WITH WARNING POINTS INDICATED IN IT. SHOULD YOU HAVE ANY PROBLEM WITH KIT INSTALLATION, PLEASE CONTACT **HFS© SUSPENSIONES** VIA WEB PAGE www.suspensionhfs.com.

WARRANTY

HFS© SUSPENSIONES guarantees that during a period of two (2) years from original purchase date, that its products are free of defects in its materials or in its manufacturing. All **HFS© SUSPENSIONES** products must be inspected in the factory. If during the inspection **HFS© SUSPENSIONES** would detect a material or manufacturing defect, **HFS© SUSPENSIONES** will choose between replacement of the damaged part or its repair . This warranty is the only and exclusive compensation that the customer has right to. **HFS© SUSPENSIONES** will not be responsible of any other damage or indirect injuries.

Warranty exclusions

This warranty will not be applied to those products incorrectly installed or adjusted, without following installation instructions provided by **HFS© SUSPENSIONES** . This warranty does not cover damages that could suffer the product as a consequence of accidents, impacts, improper use, not complying with manufacturer instructions, or any other circumstance in which the product has been used with forces or loads that has not been design to receive. This warranty does not cover any damage caused by modifications done in the product. It will be required the purchase justification (invoice including the serial number without modification or distortion). Repairing or substitution during warranty period will be valid only by presenting the original purchase invoice sent directly to **HFS© SUSPENSIONES** together with the product with paid transport. The decision to repair or substitute the product will be adopted under the exclusive criteria of **HFS© SUSPENSIONES**, after product and invoice inspection. This warranty does not cover wearing or ageing of the parts that are under wearing conditions in normal usage. The following parts can suffer normal wearing or ageing: piston seal, piston sliders, o-rings, screws or springs.

WARNING

YOU MUST NEVER UNINSTALL GAS SPRING WITHOUT RELEASING PRESSURE FROM THE ELEMENT

If you try to unscrew the element from the fork without releasing air pressure you could make irreparable damage in upper cup's thread, or having an accident during disassembly or its utilisation.

WARNING

IF YOU USE YOUR MOTORBIKE WITH AN INCORRECT PRESSURE IN THE ELEMENT, YOU COULD LOSE CONTROL AND MIGHT HAVE SERIOUS OR FATAL INJURIES

In this instruction manual it is included a graphic or written indications in order to do pressure adjustment in the gas element, depending on driver's weight.

It is admitted variation with respect to the recommended value, as indicated in the mentioned graph or written instruction. Do not pass indicated limits, both lower and upper.

ASSEMBLY INSTRUCTIONS

GENERAL

1. When a suspension system not approved by motorbike's manufacturer is installed in the motorbike, behaviour could be affected. **HFS© SUSPENSIONES** is not responsible for damage or accidents after its kit installation in the motorbike. Please contact **HFS© SUSPENSIONES** technical service for advice entering in www.suspensionhfs.com.
2. If you have doubts about installation procedure, contact **HFS© SUSPENSIONES** entering in www.suspensionhfs.com, or with qualified personnel.
3. For assemblies related to original parts, it is mandatory to refer to manufacturer's motorbike Workshop Manual.
4. **HFS© SUSPENSIONES** products are in a continuous update process; manuals include latest available version about installation procedure. Should you find differences, please contact **HFS© SUSPENSIONES** entering in www.suspensionhfs.com.
5. If the element is pressurized being unassembled, **the element has to be in vertical position with valve upwards** before releasing the air from inside through the valve (It is possible that a small amount of oil is poured through the valve; this is due to the small retention of oil in narrow holes that there's in the valve circuit). **Never release air with valve downwards.**

INSTALLATION PROCEDURE

1. Lift front wheel from ground. [1]

2. Disassemble original spring and adjustment of fork's oil.

GENERAL WARNING

Each motorbike is different. During disassembly process described from now on, probably you will need to disassembly parts to be able to follow the installation procedure. For instance, plastic covers, handle bar, hand guards … If this should be the case, please refer to the Manufacturer's Workshop Manual making sure that all disassembled parts are assembled according to specification.

2.1. Loose fork's upper clamp bolts (it is not necessary to disassemble completely) [2]
2.2. Disassembly fork's bar upper caps [3]
2.3. Take out spring and spacer (if any) [5] (in some models it Could be necessary to disassemble handlebar) [4]

This system requires less fork oil volume in fork's bottle than specified by manufacturer. This can be done in two ways: pouring all fork oil and refilling with the adequate volume (see 2.4.1 – 2.4.3) or maintaining existing fork oil and taking out some volume.

2.4. Adjust fork oil volume (make this operation for each fork).

Method 1:

2.4.1. Unscrew pouring screws in bottle's lower area (or disassemble complete fork if there are no pouring screws) [Figure 6]
2.4.2. Take out oil completely. Leave some time for a complete drain. Assemble pouring screws or complete fork.
2.4.3. Fill with following specified volume [Figure 7]

WARNING

In normal conditions it is necessary to add 60 c.c. less than Manufacturer's specified volume.
Nevertheless, make sure that, with the fork extended completely, damping duct remains completely covered by oil. Make this check following the procedure showed later. When you install the new spring, you must hear it is falling on fork oil.

Should this were not the case, add small quantities until procedures' condition is reached.

Consult **HFS© SUSPENSIONES** in case of doubts.

Method 2: This method can be applied only if oil volume into the fork is manufacturer's exactly specified volume.

2.4.4. Take out the volume specified later using a large syringe with a tube fitted in its end. It is possible that you need so suck several times. Use a device with good and clear indications to check extracted volume. Repeat this in each fork.

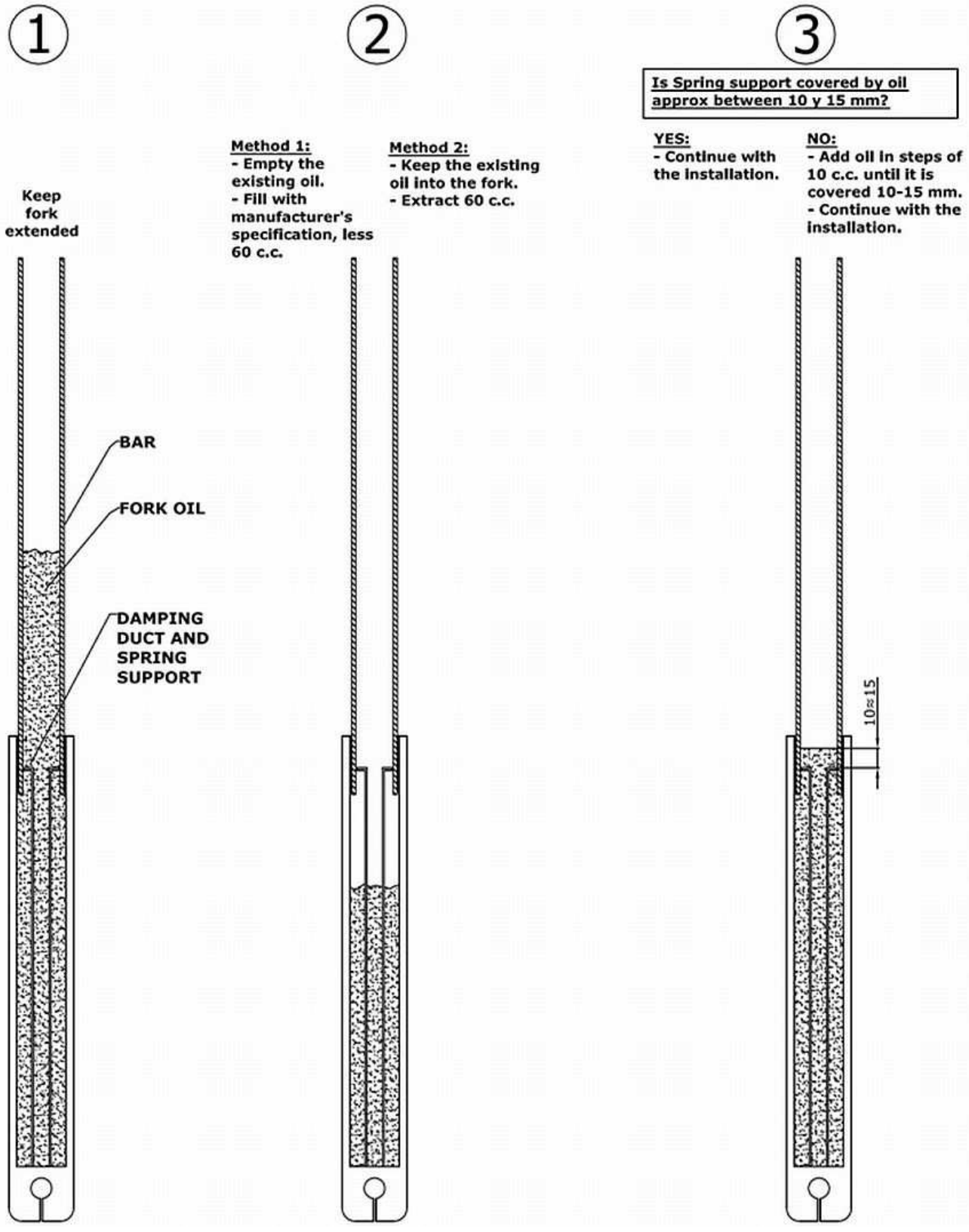
WARNING

Extract 60 c.c. from each fork.
Nevertheless, make sure that, with the fork extended completely, damping duct remains completely covered by oil. Make this check following the procedure showed later. When you install the new spring, you must hear it is falling on fork oil.

Should this were not the case, add small quantities until procedures' condition is reached.

Consult **HFS© SUSPENSIONES** in case of doubts.

Procedure to check minimum fork oil volume:


1
2
3
Keep fork extended
Method 1:
- Empty the existing oil.
- Fill with manufacturer's specification, less 60 c.c.
Method 2:
- Keep the existing oil into the fork.
- Extract 60 c.c.
Is Spring support covered by oil approx between 10 y 15 mm?
YES:
- Continue with the installation.
NO:
- Add oil in steps of 10 c.c. until it is covered 10-15 mm.
- Continue with the installation.
BAR
FORK OIL
DAMPING DUCT AND SPRING SUPPORT
10≈15

3. Introduce HFS® springs [Figure 9] . Read GUIDE FOR SPRING SELECTION chapter. In figure it is shown medium stiffness spring (two marks) [Figure 8]

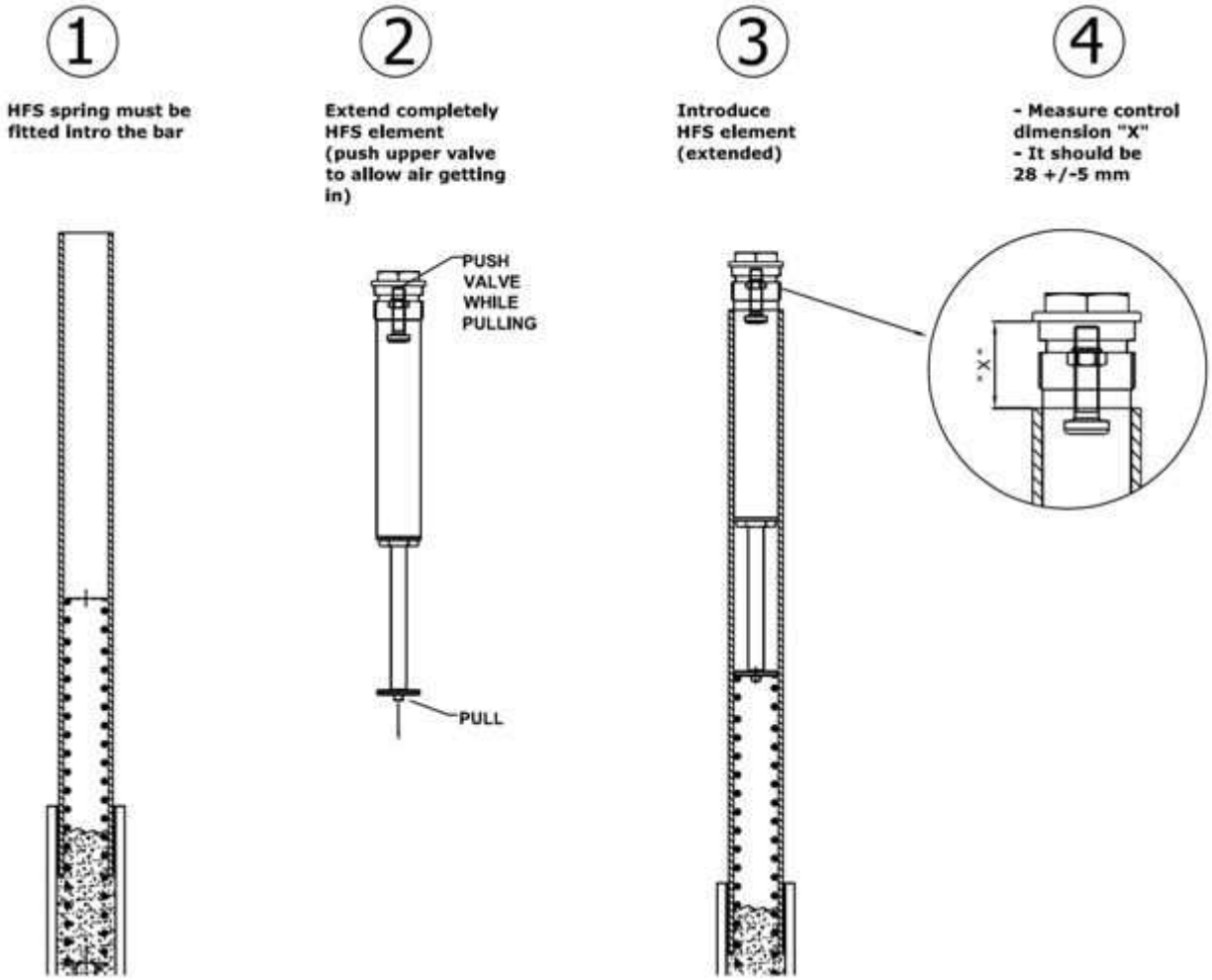
4. Install gas spring element [Figure 10]

4.1. Make sure that element is nor pressurised (press valve's inner axle to release pressure completely)
4.2. Make sure that element's cap o-ring is installed.
4.3. Introduce the element. There are some models that could fit a plastic spacer under thrust washer. In these cases, check that it is correctly fitted [Figure 15].

WARNING

We have observed that in some classic motorbikes the fork that is installed is not the original from the manufacturer, or also sometimes inner parts have been altered from the original design.

Before tightening HFS® element, it is necessary to check a control dimension, according following steps:



In control dimension is not 28 ± 5 mm, please contact your dealer or www.suspensionhfs.com.

4.4. Press slightly and screw in the bar. Tightening torque 20 Nm. [Figura 11].

5. Install handlebar.

6. Put pressure in gas element. In this operation front suspension must be unloaded.

6.1. Unscrew valve's cap [Figure 12].
6.2. Screw in pump terminal [Figure 13].
6.3. In classics Trial models, it is recommended 3 bar as starting set-up pressure. Make sure that you check pressure in pump's manometer as much perpendicular to the scale as possible.
In [Figure 14] it is indicated 3 bar as an example; 2,5 bar corresponds to the small mark right before 3 bar's.
6.4. Screw valve's cap (do not over-tighten) [Figure 12].

7. Put the motorbike on the ground.

WARNING

WATCH FOLLOWING ITEMS:

(a) Do not apply more than 5 bar pressure. This limit is because of behaviour, not due to element's performance.

(b) It is recommended to make a first set-up with 2,5 bar; ride in an authorised and known road, and increase or decrease in stops of 0,25 bar depending on feeling.

(c) Increasing or decreasing element's pressure it is modified static sag. Pilot can leave it to his choice.

(d) After the first adjustment or re-adjustments, **drive carefully to feel change in response.**

(e) Apply same pressure in both elements.

WHEN UNSCREWING PUMP TERMINAL, AIR LEAK NOISE IS NORMAL.

PRESSURE CHECK OR RE-ADJUSTMENT

WARNING

1) ADJUST ELEMENT'S PRESSURE WITH NO LOAD IN FRONT FORKS

2) NEVER USE A COMPRESSOR TO APPLY PRESSURE (DO NOT USE PETROL STATION OR WORKSHOPS DEVICES)

3) DO NOT DEPRESSURIZE THE ELEMENT WITH SUSPENSION LOADED BECAUSE OIL LEAKAGE WILL OCCUR AND REPAIR WILL BE NEEDED.

For checking or re-adjustment, make following steps:

1. Lift front suspension from ground.
2. Unscrew valve's cap in both elements.
3. Screw pump's terminal to the valve.
4. Apply some more pressured than desired; adjust required value stepping down pressure with pump's micro button.
5. Unscrew the pump. A SMALL AIR LEAK NOISE IS NORMAL.
6. Screw valve's cap (do not over-tighten).
7. Repeat same steps in the other fork.
8. Put the motorbike on the ground.

PRESSURE ADJUSTMENT PUMP USE INSTRUCTIONS

1. General:

It is a pump to apply pressure to suspension forks.
It has a small button for micro adjustment.

2. Instructions:

2.1. Connect terminal to element's valve.

If pump terminal is "ON-OFF" type, connect it to the valve with the small lever released (figure 1, "OFF"); to pressurise, turn the lever 90º as indicated in figure 2, "ON" position.

Figure 1 – **"OFF" position**

Figure 2 – **"ON" position**

2.2. Pump until it is reached desired pressure. **It is recommended to overcome target value a little, and to use small micro adjustment button to reach desired value.**

Each time micro adjustment button is pressed, it is released some pressure between 138 and 207 mbar (2 – 3 psi).

Remark 1: Due to large end-of-scale, it is recommended adjustments in steps of 0.25 bar. This is enough from functionality point of view. See following figures.

Pumps with dial in black colour:

3,5 bar 4 bar 4,25 bar

Observe that after 0, first indication is 2 bar (⟶)

Pumps with dial in white colour:

Each mark is 0,5 bar
First mark is 1 bar (⟶)

2,5 bar setting **3 bar setting** **2,75 bar setting**

Recommendation for setting in motorbike testing is with steps by 0.25 bar (indicator between two marks).

2.3. If pump is "ON-OFF" type, turn the lever to "OFF" position (figure 1).

2.4. Unscrew pup terminal.

Remark 2: When unscrewing pump terminal you will hear a small air leak noise. This is normal (it is the air occluded in pump's circuit).

GUIDE FOR SPRING SELECTION

(Applicable for kits with 2 or 3 spring sets)

1. General:

HFS® kit can be supplied in two configurations: with 1, 2 or 3 sets of springs. The difference is the spring rate, and it is used for performance fine tuning.
With this it is available suspension set-up possibilities changing the springs, additionally to pressure adjustments.
When element pressure is changed, the result is a change in static sag. It is also changed bottoming limit as well as the response of suspension in extension.
Change of spring is basically related to two factors: pilot's weight and preferences regarding suspension performance; it is obtained an increase in overall suspension's spring rate along fork's stroke. It is obtained a higher bottoming limit, and it is adequate for pilots with a higher weight, loaded motorbikes, extra-capacity fuel tanks… or only to have stiffer suspension behaviour. An estimated threshold of pilot's weight to choose a medium or heavy rate spring can be around 85-90 Kg , equipment included.
Combining spring change and pressure set-up you can obtain a very wide range of adjustments.

What has been indicated above is just an orientation. It might happen that a pilot that is lighter would prefer a higher constant rate spring or vice versa. Optimum configuration is reached through tests
In case of doubts, put in contact with www.suspensionhfs.com or with your distributor.

WARNING **BEFORE DISASSEMBLY OF HFS® ELEMENT (for instance, to change the springs), IT IS NECESSARY TO RELEASE ALL PRESSURE FROM THE ELEMENT, PAYING ATTENTION TO UNLOAD FRONT WHEEL BEFORE (SUSPENSION WITHOUT LOAD).**

2. Springs identification:

Different Springs are identified with marks in one of its ends. Difference is only spring rate.

2.1. Standard stiffness: Identified with 2 marks (figure 1).
2.2. Lower stiffness: Identified with 1 mark (figure 2).
2.3. Higher stiffness: Identified with 3 marks (figure 3).

Figure 1

Figure 2

Figure 3

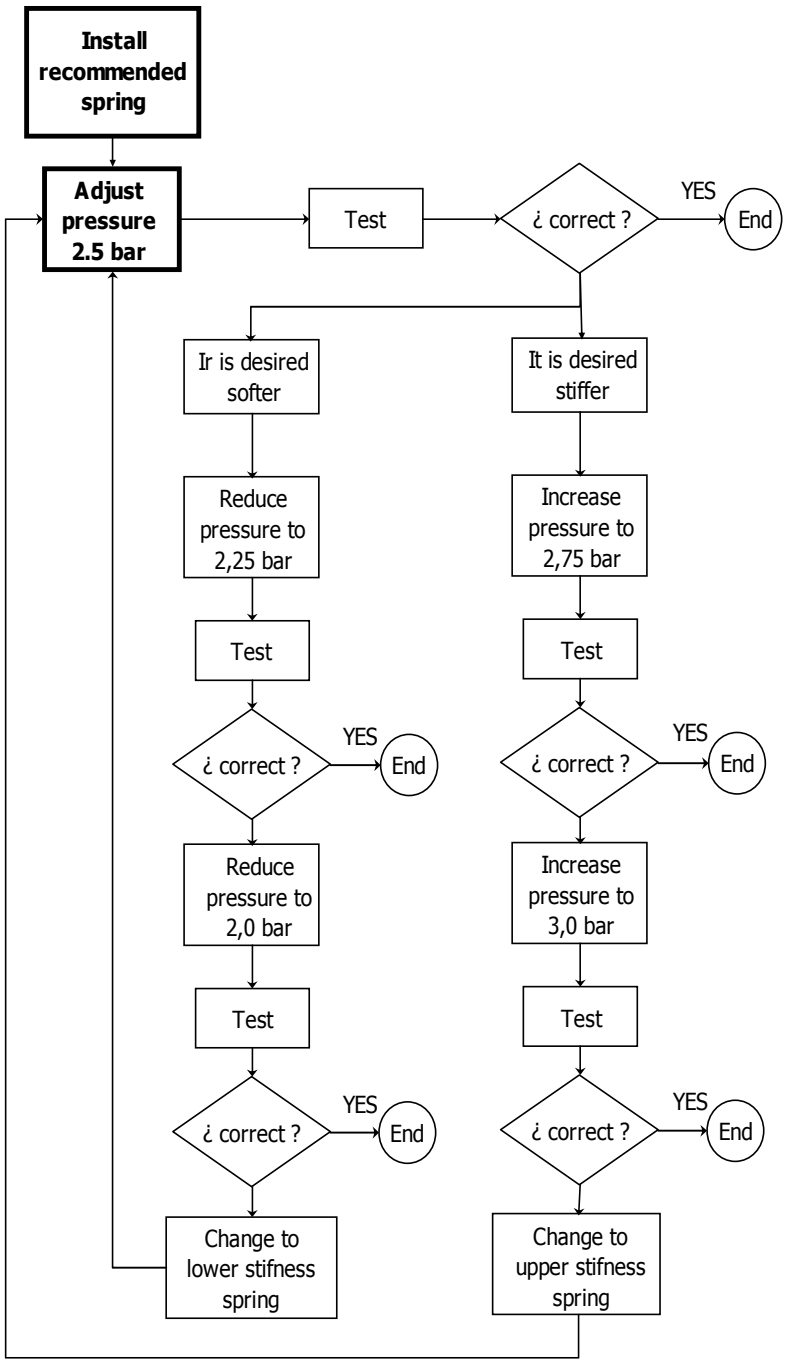
3. Initial recommendation for classics Trial motorbikes (indicated weights are with equipment included:

- For pilots around 80 Kg, it is recommended to start with standard spring, 2.5 bar set-up pressure.

- For pilots over 85-90 Kg, it is recommended to start with Higher Stiffness spring, 2.5 bar set-up pressure.

- For pilots around 70 Kg, it is recommended to start with Lower Stiffness spring, 2.5 bar set-up pressure.

- To find behaviour differences, it is recommended to change pressure in steps of ±0,25 bar.



When HFS© optimum configuration is selected, it is possible to try different fork oil viscosities; for instance, to obtain a slower response in extension it can be increased oil viscosity index and then test again.

For competition use, a good try can be increasing 5 or 10 units in SAE index (SAE 15W o 20W coming from SAE10W).

With HFS© system it is not usual to reduce fork oil viscosity with respect to manufacturer's specification.

FIGURES:

- It is included following pictures to help in HFS® kit installation.
- Use tooling and fixtures reliable to avoid accidents.
- Assure correctly the motorbike when front end is lift.
- Tools required:

Operation	Tool
LIFT THE MOTORBIKE	- Appropriate support
LOOSEN UPPER FORK CLAMP	- Appropriate socket
REMOVE HANDLE BAR	- Appropriate socket
REMOVE FORK'S CAP	- Appropriate socket
TAKE OUT THE SPRING	- Metal wire with hooked end of a magnetic tip - Used cloths for drips
TAKE OUT FORK's OIL ☒ See procedure	- screwdriver for drain screw - Syringe, 100 c.c - Plastic tube - An accurate volume measuring device - Used cloths for drips
IMPORTANT JOINTS (see HFS® manual and manufacturer's workshop manual)	- Dynamometric wrench
TIGHTENING OF HFS® ELEMENT	- Appropriate socket
REMOVE VALVE'S CAP	- Wide screwdriver (to prevent part damage)

In attached figures the process is explained based on an OSSA 250 MAR. Use it as a guide of the different steps, making adaptations according with the motorbike you are working in.

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

Figure 12

Figure 15

Figure 13

Figure 14